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Preface

Many questions remain unanswered in the field of self-directed learning, and some of the most persistent and important are addressed in this issue of IJSDL. David Sackett, a well-known pioneer of evidence-based medicine, famously summed up one of the major reasons that development of self-directed learners is increasingly being recognized as an urgent need:

Half of what you'll learn in medical school will be shown to be either dead wrong or out of date within five years of your graduation; the trouble is that nobody can tell you which half -- so the most important thing to learn is how to learn on your own. (Cited in Daily & Landis, 2014, p. 2066)

Dr. Sackett's comment could be applied to almost any professional preparation program or occupation, and to many other areas of life as well. Information and technology are proliferating so rapidly that lifelong, self-directed learning is imperative for everyone. This issue includes two articles related to SDL in the health professions, one that examines and categorizes internet resources, and one that explores some fine points related to self-efficacy. We hope you find them helpful.

After extensive review of the literature and drawing from Premkumar's research and experience in medical education, Morrison and Premkumar offer thoughtful and well-documented strategies for promoting self-directed learning in medical preparation programs in the first article in this issue.

In a yearlong study, Kim and her coauthors analyzed 305 informal learning websites and virtual education websites available at no cost to individual learners. The research was designed to reveal the essential characteristics of successful online resources and technology tools that are important resources for self-directed learning. The websites were categorized and then evaluated based on criteria refined in the study, providing a helpful resource for self-directed learners and those who want to assist others in pursuing SDL.

Ponton, Carr, and Wiggers explored the specific area of persistence in a novel pursuit in the face of failed efforts at mastery. Their research was designed to determine if perseverance in performances without a history of success appear to be due to beliefs of self-efficacy in the performance itself or to beliefs of self-efficacy to learn the performance.

Payne, Rocks, and Schaffner examined learner self-direction and self-determination over the course of academic preparation programs in nursing and athletic training, noting some differences in outcomes between the two programs.

Lucy Madsen Guglielmino, Editor

Reference

Daily, J. A., & Landis, B. J. (2014) The journey to becoming an adult learner: From dependent to self-directed learning. *Journal of the American College of Cardiology*, 64 (19), 2066-2068. Retrieved from <http://content.onlinejacc.org/article.aspx?articleID=921687>

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PRACTICAL STRATEGIES TO PROMOTE SELF-DIRECTED LEARNING IN THE MEDICAL CURRICULUM

Dirk Morrison and Kalyani Premkumar

Ideally, the 21st century physician, as a lifelong learner, is empowered by a deep understanding and actualized skills of self-directed learning (SDL). While SDL is an intuitively valued element of most medical education curricula, unless SDL is *explicitly* valued and spirally *integrated* across the curriculum, it is unlikely to be acquired as a core learning skill set by undergraduate medical students. In this paper, we outline a coherent set of practical strategies to promote and sustain SDL in the undergraduate curriculum. The implementation of these teaching and learning strategies may reverse a trend discovered in one medical school (i.e., a drop in student SDL readiness), by providing a teaching and learning environment in which the principles of SDL can be fully supported and actualized.

Self-directed learning (SDL) skills involve the ability to manage learning tasks without having them directed by others and are necessary skills for effective lifelong learning (Weimer, 2010). There is an expectation that medical students will become self-directed learners as they mature and gain content knowledge and that this will naturally occur as they proceed through medical school. It seems intuitively obvious that SDL is an important principle of lifelong learning (Candy, 1991) and that lifelong learning is a general expectation for the health professions; SDL provides a critical orientation and learning skill set necessary to sustain currency in professional knowledge and skills for any practicing medical doctor. From a review of a number of reports and publications and from a variety of organizations responsible for medical education (e.g., Association of Faculties of Medicine of Canada, 2012; Australian Medical Council, 2011; General Medical Council, 2009; Royal College of Physicians and Surgeons of Canada, 2005 & 2015; The College of Family Physicians of Canada, 2009), it is clear that the principles of SDL are important goals, whether explicitly stated or implicitly suggested, for medical curriculum revitalization and visioning.

While SDL is valued, at least in principle, along the medical education continuum (undergraduate, postgraduate and continuing professional education), there is a clear lack of documentation regarding how to promote and actualize SDL. A recent longitudinal study (Premkumar et al., 2013) of undergraduate medical students at the

University of Saskatchewan's College of Medicine assessing changes in *self-directed learning readiness*, as measured by the Self-Directed Learning Readiness Scale (SDLRS) or Learning Preference Assessment (Guglielmino, 1978; Guglielmino & Associates, 2010) indicated a significant *drop* during undergraduate medical training, as compared to measures of SDL readiness at admission. Given that entering students of health professions have been shown to have *higher* SDLRS scores as compared to the general student population (Premkumar et al., 2013), it is speculated that specific factors in the traditional orientation and structure of the medical curriculum (e.g., cognitive overload, assessment types, lack of time, etc.) may erode an initial positive orientation toward self-directed learning.

Reversing the Trend: Integrating SDL principles and Strategies Into the Curriculum

While the main findings of the above research are important markers of a potential curricular problem, the focus of the remainder of this paper is to share concrete strategies for medical educators to use that could promote and sustain the important skills of SDL in undergraduate medical education curricula. It is speculated that the implementation of these teaching and learning strategies may reverse the trend discovered (i.e., a drop in SDL readiness) by providing a teaching and learning environment in which the principles of SDL are explicitly valued, fully supported and demonstrably actualized. Note that while the tips presented below appear as discrete items, it is understood that there will be overlap and integration between various interventions and SDL teaching/learning strategies.

Strategy 1: Provide an Orientation to SDL

It is likely that many students and faculty exercise skills and competencies of SDL but may not understand them as such. At the beginning of a medical student's orientation to the curriculum, significant efforts must be made to make the actualized and expected goals and principles of SDL explicit. Clearly explaining how SDL is an expectation of all students and that it is an integral part of the overall curriculum, a consistent pedagogical theme, will be an important part of such an orientation (Daniels, 2011). For example, during orientation, students can be encouraged to learn the skills of SDL by using and understanding Knowles' five-step model:

1. Diagnose learning needs.
2. Formulate learning goals.
3. Identify human and material resources for learning.
4. Choose and implement appropriate learning strategies.
5. Evaluate learning outcomes. (Adapted from Knowles, 1975).

Strategy 2: Identify Individual Learner's SDL Readiness and Skill Level

It would be helpful for both medical educators and students alike to have an understanding of where they stand in terms of being ready to learn using SDL approaches. The SDLRS instrument, implemented any number of times across the

curriculum, could be used as a diagnostic tool to provide additional support to students, modify the curriculum, or enhance the SDL activities embedded (Guglielmino, 1978, 2014). The application of Grow's (1996) *Staged Self Direction Model* (stage 1: low self-direction - stage 4: high self-direction) may also provide some insight here, including a more detailed understanding of where the medical students are regarding readiness for self-direction as implemented in the curriculum. For example, learners may only be at stage three and require discussion facilitated by a teacher who participates as an equal, works well in seminars and group projects before moving on to stage four, whereby the student is not simply “involved” but is self-directed; the teacher is now not just a facilitator, but consultant/delegator, and the pedagogical approaches would include, for example, internships, dissertations, individual work and/or self-directed study-groups (Grow, 1996).

SDL readiness will likely vary based on situation and topic. It would be important to understand learner readiness to engage with SDL and make adjustments to the curriculum. For example, Dynan, Cate, and Rhee (2008), in reviewing a research study that grouped learners in structured and unstructured learning environments based on their SDLR scores found that the SDLRS scores increased in *both* groups. They concluded that: “The evidence suggests that structure match enhances SDL [self-directed learning] skills. The empirical findings suggest also that courses designed to enhance students’ readiness for SDL can do so” (p. 99). This finding would point to considerations of relative flexibility of medical education learning environments, based on early measurements of SDL.

Strategy 3: Clarify and Promote the Development of SDL Competencies

As Weimer (2010) points out, a core set of competencies for SDL would include the ability for learners to “assess the demands of the task, evaluate their own knowledge and skills, plan their approach, monitor their progress, and adjust their strategies as needed” (p. 5). Other competencies would include: “proficiency in assessment of learning gaps, evaluation of self and others, reflection, information management, critical thinking, and critical appraisal” (Premkumar et al., 2013). Explicitly providing instruction and opportunities to practice these skills, across the curriculum, will be critical if SDL is to be successfully integrated. In addition, Weimer (2010) states that research indicates SDL skills are developed much more efficiently by *direct instruction* than by happenstance, and includes the need to hone metacognitive skills. Extracting from research conducted by Ambrose, Bridges, DiPietro, Lovett, and Norman (2010), she lists the following as important SDL tips:

Help students:

- *Assess the task* by being more explicit than you may think necessary.
- Evaluate how well they’re equipped to do the task by providing opportunities for self-assessment early and often.
- *Plan an appropriate approach* by first implementing a plan you’ve provided and then by creating their own plans.
- *Apply selected strategies and monitor progress* by having students do guided self-assessments.

- Adjust their strategies by encouraging them to analyze the effectiveness of what they have done.

Self-directed medical students would also need to know that there are *multiple approaches* to any series or type of task; this, in turn, expands on their repertoire of strategies they can activate under other and/or similar learning conditions.

Strategy 4: Provide Opportunities to Pursue Own Interests

While it is important to encourage learners to approach a task in different ways using different strategies, it is also critical that learners actively and methodically pursue their own interests. This may be achieved by framing SDL in the way learning and instruction is organized. Early developments elaborate on linear models in which learners move through a series of steps in order to reach their learning goals (e.g. Knowles, 1975). Later models present frameworks for integrating SDL into formal educational settings in other ways (Grow, 1991; Hammond & Collins, 1991; Merriam, Caffarella, & Baumgartner, 2007).

With the exponential increase in medical knowledge, the curriculum tends to be loaded, with little time for students to even complete the assigned reading (Klatt & Klatt, 2011). Therefore, instructors need to think creatively to facilitate such pursuits. Currently, medical students are usually given opportunities in their senior years to pursue experiences in medical specialities or areas that are of interest to them (Lehmann, Kremer, Werwick, & Herrmann, 2014). However, while this may be considered as promoting SDL, more and more varied opportunities need to be provided throughout the curriculum. For example, students can be given opportunities to pursue specific topics of interest within individual courses; this SDL process needs to be formalized with incorporation of an appropriate assessment component. Finally, while most medical education systems utilize an integrated problem-based approach to learning (Diaz-Perez, Raju, & Echeverri, 2014), more often than not, the problems are preconfigured (this may be necessary, of course, in clinical case studies, etc.) and are therefore not authentic to the learner. As often as is reasonable, providing strategies and learning contexts whereby learners formulate their own problems (individual or collective) to be researched and solved, will provide another layer of authenticity and, potentially, increase learner engagement and deeper learning.

Strategy 5: Activate Collaborative Learning

While SDL is seen by many as synonymous with *autonomous* learning (insinuating a “learner learning alone”), nothing is farther from the truth: opportunities to learn *with* other like-minded, like-motivated peers is not antithetical to the principles of SDL. Providing multiple and varied opportunities for team-based learning, peer teaching and project or problem-based group learning would underscore the fact that the principles of SDL can be actualized via individual learner strategies and collaborative group processes.

If deep understanding of the medical curriculum is to be achieved, Barrett and Moore (2011) argue for the need to create environments and processes whereby learners actively create and re-create knowledge together, by sharing ideas, confronting

divergent views and interpretations, embracing shared meanings and by deeply engaging with learning problems in “interactive, collaborative, communicative ways” (Armitage, 2013, p. 5). Importantly, educational technologies of a wide variety and type (e.g., discussion forums, wikis, blogs, synchronous video conferencing, etc.) can be brought to bear on collaborative activities, enhancing a traditional, face-to-face approach to team-based learning. However, teaching and learning strategies for developing students’ collaboration skills must be considered and implemented if such tools are to enhance the experiences (Whitney & Smallbone, 2011).

Strategy 6: Encourage Meaningful Reflection

It is clear that understanding, implementing and practicing the metacognitive skill of deeply reflecting on one’s learning is not a easy, simple, nor natural task. It will be important, therefore, to provide a conceptual and operational framework, an *evaluative scaffold*, if you will, whereby the learner can actively and critically reflect on their SDL. End goals of this active reflection might be to look for insights into how one learns best, evaluate and then make adjustments in personal learning strategies, pursue promising avenues of investigation and interest, reflect *on* action (i.e., retrospective analysis) and reflect *in* action (a mindfulness *while* one is executing an action) (Schon, 1983). For example, the use of an *application journal* such as Day One (Bloom Built, 2014) or Evernote (Evernote Corp., 2008) in which learners connect and make meaning of what they have learned to a “real-world” context or problem, could be an effective tool and strategy to enable a focused SDL reflective process. Regularly annotating *e-portfolio* entries (resources, insights, observations, creations, etc.) in terms of the type, quality and meaningfulness of the learning experienced (Lorenzo & Ittelson, 2005) would be another approach.

Finally, reflective exercises could also encourage the learners to conduct self-assessment of gaps in their learning, where they need to work on new knowledge, skills, competencies, attitudes—this is at the heart of a SDL orientation. Of course, as outlined above, these strategies could be utilized at the group level as well (e.g., the group evaluates how well it is doing regarding a collaborative task).

Strategy 7: Alter Student Assessment To Integrate SDL

With a little reflection, it is clear that multiple choice, fill-in-the-blanks, short answer and other such assessment tools, while affording efficiencies (e.g., machine-graded), offer little to create opportunities for SDL, or, more accurately, *self-directed assessment*. Project-based, problem-based strategies are not new to medical education; but, as mentioned earlier, they are usually prescribed; encouraging small groups of students to create their own problems as well as assessment methods to evaluate the relative quality of solutions posed moves well down the path of an integrated approach to SDL. This approach integrates well with other strategies, including the “flipped classroom” (Zappe, Leicht, Messner, Litzinger, & Lee, 2009) or annotation of portfolios/e-portfolios, which have been used with great success to seamlessly support an approach to assessment that is SDL-based (Driessen, van Tartwijk, Overeem, Vermunt, & Vieuten, 2005). Driessen et al. (2005) outline some of the necessary conditions for the successful use of portfolios in medical education; what is especially

important in this study is that they were able to show that “portfolios are a potentially valuable method of assessing and developing students’ reflective skills in undergraduate medical training...” (p. 1230). If this method is to be used to encourage and support SDL, then necessary conditions need to be fulfilled, including: “an appropriate portfolio structure, an appropriate assessment procedure, the provision of enough new experiences and materials, and sufficient teacher capacity for adequate coaching and assessment” (Driessen et al., 2005, p. 1230). With these caveats in mind, it is exciting to consider the possibilities for an integrated SDL e-portfolio system for undergraduate medical education.

Strategy 8: Make Time Available for the Processes of SDL

Given the sheer volume of information the average medical undergraduate student needs to “consume” and “digest,” and the limited space available in the curriculum, it will be critical to understand that, as Goodlad (1984) points out, “teachers both condition and are conditioned by the circumstances of schools...; time is virtually the most precious learning resource they have at their disposal...[and]...differences in using time create inequities in opportunity to learn” (pp. 29-30). The system, then, perpetuates the use (or misuse) of this precious and limited commodity; a radical shift in thinking will need to occur in order to press for allocations of time for SDL activities and processes. It is important, when making such arguments, to underscore that we are not arguing for simply more time but echo the sentiments of Goodlad (1984), who states:

We must not stop with providing only time. I would always choose fewer hours well-used over more hours of engagement with sterile activities. Increasing [time] will, in fact, be counterproductive unless there is, simultaneously, marked improvement in how time is used. (p. 283)

We would argue that one of the best ways to improve the efficient use of precious time in the medical curriculum would be to use a significant portion of it for SDL priorities.

Strategy 9: Emphasize Dialogical Learning as a Core Method

The demonstrated power of dialogue as the cornerstone for engaged and deep learning seems clear. Armitage (2013) asserts:

...Dialogue brings together the teacher and the student in the joint act of knowing and re-knowing the object of study, where instead of transferring knowledge statically, as a fixed possession of the teacher, it demands and recreates acts of knowledge through the process of conscientization. (p. 7)

Other scholars note that “the dialogical method...holds out a potential of creativity and breakthrough which gives unusual rewards, mutual illumination” (Shor & Freire, 1987, in Armitage, 2013, p. 49). Exploring ideas, facts and information, cases, problems, solutions, etc. through peer discussion is a necessary component of any quality educational experience, but seems especially critical in medical education. However,

this dialogical environment need not be limited to classroom-based, seminar-style face-to-face experiences. Rather, harnessing current information and communication technology tools (e.g., smart phones), learners would be able to extend the discussion not only in real time, but also asynchronously with other medical students across the country or the globe; it is our view that the full potential of utilizing these peer communication tools for the purposes of SDL remain untapped.

Strategy10: Provide and Train Learners in the Use of Information And Communication Technologies (ICT) Tools to Enhance SDL Strategies

In their work outlining the impact of e-learning in medical education, Ruiz, Mintzer and Leipzig (2006) underscore that “e-learning technologies offer learners control over content, learning sequences, pace of learning, time, and often media, allowing them to tailor their experiences to meet their personal learning objectives” (p. 207). The ever-increasing power of information access and management tools, literally available at one’s fingertips (e.g., via touch-screen computing devices) virtually anywhere one has a functional Internet connection, has forever changed medical practice and it should also forever change how we conduct medical education. ICT-based tools allow *anywhere, anytime, anything* access to information, knowledge, personal networks, etc. And, this is not just a privileged-world phenomena: Komolafe-Opadeji (2009), in a description of health information management skills and ICT training needs for Nigerian tertiary medical librarians, illustrates the point that “the nature of medical knowledge and technology requires everyone in the health sector have computer skills” (p. 1).

Strategy 11: Help Learners to Manage and Evaluate Information

In this era of not only ubiquitous mobile ICT devices, from smartphones to tablets, to powerful laptops, but increasingly ubiquitous connectivity (to the Internet), it is imperative that medical students learn, practice, and enhance their skills regarding acquiring, selecting, and evaluating learning resources. Honing these skills to include critical appraisal of the trustworthiness (of sources, validity, etc.) of relevant and targeted information resources will prepare medical students for the realities of being a physician in the 21st Century (Cronin et al., 2014). With the rapid and expanding research and knowledge base in the health sciences, long gone are the days when a physician could rely solely on the information presented in medical school. Importantly, developing these skills supports an SDL orientation of critical thinking/critical appraisal, as well as generating a greater tolerance for uncertainty or incompleteness of one’s knowledge. It becomes very clear, very quickly, that no single physician can know it all or have the final answer or the absolutely correct answer; but any physician, properly trained, using the ICT tools at his disposal, can have the best answer given what we know and are able to access now. Careful and purposeful integration of a variety of ICT tools and techniques, wrapped around concrete SDL activities and strategies, will go a long way to provide the skills and competencies for future physicians.

Strategy 12: Train Faculty in SDL

The most critical factor in the successful implementation of an innovation such as the integration of SDL across the medical curricula will be medical faculty buy-in, which, initially, may be little more than positive regard, or a general agreeableness to the idea. Ideas from existing workshops and resources may be utilized for this purpose (Bulik, 2004; Piskurich, 2011). Once the idea of SDL takes root, providing concrete evidence of its efficacy via trials, evaluations, positive assessments, etc., then broaching the next steps, namely, taking an integrated approach to SDL and moving well beyond buy-in from medical faculty to an institution-wide commitment to training in the design, delivery and evaluation of SDL strategies will ensure effective implementation.

Conclusion

The skills represented by a reflective and critical approach to SDL are *lifelong* skills that any 21st century physician must possess and exercise in order to keep abreast of the dynamic, rapid-fire, volatile, and ever-expanding medical landscape of information and knowledge. This reality provides a strong case for the immediate, creative, and purposeful integration of SDL principles into any medical education spiral curriculum (Harden, 1999), whereby SDL is vertically incorporated, with increasing complexity of expectations.

It is important to underscore that many of the SDL learning strategies described above, especially those that are skills, knowledge, attitudes-based, are not mutually exclusive; it is likely that these would be used in an ever-changing constellations or combinations, when needed and as the particular SDL challenges dictate. The point here is that the medical student uses what she needs, when she needs it; and applies these in the ways she needs to, to direct and be in control of her own learning.

It is clear that not all of the suggestions provided above could immediately, or easily be adopted and integrated by any particular medical education faculty and curriculum. However, moving the established medical education system toward a greater emphasis on self-directed learning principles and practices, even if incrementally, would be a step in the right direction and yield positive results as we prepare the doctors of tomorrow for lifelong learning. In order to bring about a systemic change, there is an urgent need for the leadership team of medical schools to be formally trained in medical education, with emphasis on mindful integration of self-directed learning.

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**ANALYZING THE HUMAN LEARNING AND DEVELOPMENT
POTENTIAL OF WEBSITES AVAILABLE FOR INFORMAL
LEARNING**

**Minkyong Kim, Eulho Jung, Abdullah Altuwaijri, Yurong Wang,
and Curt Bonk**

The advancement of learning technology in recent decades has broadened the possibilities for online learning in both formal and informal settings. This research was designed to reveal the essential characteristics of successful online resources and technology tools that are important resources for self-directed learning. Over the span of a year, a team of researchers collected and analyzed 305 informal learning websites and virtual education websites available at no cost to individual learners. The websites were categorized into the following six subject domains: language learning, outdoor and adventure learning, social change and global learning, virtual education, learning portals, and shared online video. Content analysis was employed to evaluate the 305 websites using eight evaluation criteria: content richness, functionality of technology, extent of technology integration, novelty of technology, uniqueness of learning environment/learning, potential for learning, potential for life-changing impact, and scalability of the audience. The six categories or types of informal learning were then compared by applying the eight criteria.

Cross (2007) contends that more than 80% of learning is informal. He notes that informal learning is the unofficial, unscheduled, and non-traditional way most people learn to succeed personally as well as professionally. For all of us, learning is a lifelong activity—one that does not end. In 2013, OECD Secretary-General Angel Gurría emphasized the importance of lifelong learning in the following statement: “Too many people are being left behind today... with effective education and life-long learning everyone can develop [his or her] full potential. The benefits are clear, not only for individuals, but also for societies and for the economy” (OECD, para 3).

Educators are increasingly called on to properly prepare learners for the digital learning skills required to succeed in a more global twenty-first century (Lee, 2006; Lee & Bonk, 2013; Merryfield, 2007, 2008; Merryfield & Kasai, 2009). Song and Hill (2007), for instance, stated that faculty members are actively utilizing Open Educational

Resources (OER) and cloud computing with the goal of encouraging informal and self-directed learning, which is increasingly becoming part of everyday life.

Kop and Fournier (2010) explored the challenges and opportunities of self-directed learners in a massive open online course (MOOC). They pointed out how emerging Web technologies have altered the educational landscape by providing learners with choices as to their learning paths. This emerging trend calls for additional research, as the tools and resources have shifted the emphasis of learning from a linear teacher-centered model to learner-centered one, wherein people increasingly select the tools, resources, and means of communication and collaboration in learning. In the same vein, learning technologists and other educators need to better understand the nature of open and online learning environments in order to encourage learners' autonomy. They concluded by emphasizing the fact that learners need sophisticated tools and resources to evaluate the utility of information available for facilitating self-directed learning.

As part of this massive increase in OER, global collaboration and interaction in online communities is also taking on greater importance than ever before. To address the new skills and competencies deemed necessary, several reports suggest that innovative activities and curricula can connect learners around the world in unique and educationally meaningful ways (Longview Foundation, 2008; Riel, 1993). Such global education curricula can also take advantage of informal online learning tools and resources. When they do, they can set in motion lifelong learning pursuits.

Online resources provide a valuable asset for self-directed learners, giving them wide access to useful learning content. With the emergence of the Web, informal learning is now at the fingertips of a wide variety of learners (Kop & Fournier, 2010). Learners in the pursuit of lifelong learning are empowered to determine what is worth learning and to use self-directed approaches for addressing a range of learning tasks (Garrison, 1997).

Clearly, during the past decade, the forms of learning delivery and opportunities to learn have exploded. For example, those who are incarcerated, injured and in a hospital bed, or unemployed and unable to pay for college tuition can learn to be more productive members of society. Others might be in transition from one career to another and find open educational resources (OER) and OpenCourseWare (OCW) made freely available by schools and higher education institutions around the planet highly valuable for achieving their learning goals (Iiyoshi & Kumar, 2008). Countless others who are undergoing a life change make use of informal and formal online learning resources. For instance, tens of thousands of people are earning degrees and certificates while performing military duties in war zones, such as Iraq and Afghanistan. One can also learn a foreign language online as well obtain a certificate or diploma for such learning. If basic skills in mathematics or reading are needed, there are dozens of freely available programs, tools, and shared online video resources. If the goals are environmental or geographic education, there are many ways for learners to enhance their appreciation and understanding of the limited resources of this planet. This plethora of online resources can, of course, be used in educational institutions, but they can also be accessed by individuals from the inside of a car, an airport concourse, a bookstore, café, or even a dogsled (Bonk, 2009; Doering, 2006; Miller, Veletsianos, & Doering, 2008).

It is evident that learning is increasingly informal and self-directed. We are living

in an age of open education where anyone can now learn anything from anyone else at any time (Bonk, 2009). Given the explosion of OER and free curriculum materials found online, the number of informal learners is likely to dramatically increase during coming decades (Cross, 2007); so will their demands for high quality and effective learning resources. Kop and Fournier (2010) and Song and Hill (2007) assert that there is also a need for enhanced supports for self-directed learners who utilize these informal online learning environments. As a first step, it is imperative to assess the quality of online resources so that informal and self-directed learners can find high quality resources to meet their learning needs.

The purpose of this study is to delineate the forms and types of informal learning that are now available online for self-directed learners and to develop and apply evaluative criteria for these learning sites, providing a valuable resource for both self-directed learners and those who attempt to assist them in locating quality resources.

Research Method

This research takes a grounded theory approach (Strauss & Corbin, 1990). The grounded theory method is centered on inductive reasoning—in contrast to the norms of traditional social science research. That is, we did not begin with a hypothesis, but with data collection in hopes of identifying a pattern in the data set. More specifically, this research underwent several stages of data collection and analyses. First, a team of over a dozen researchers from educational psychology, educational technology, and other related disciplines located, shared, reviewed, and evaluated potential informal learning sites over the course of a year in order to determine the current state of informal learning websites. Subsequently, a sub- group of four researchers rated 305 informal learning Web sites using an eight-part coding scheme. This coding scheme was developed by the entire research team of more than a dozen individuals using a set of technology features and instructional resource characteristics found in the research literature (Jung, Kim, Wang, & Bonk, 2011) (see Appendix A). The input and experiences of each member contributed to the creation and refinement of this instrument.

Members of this team used different methods for locating the various informal learning sites. They included personal subject-matter expertise, extensive Web searching, the scanning of books, reading blog posts and technical reports, and soliciting expert and colleague recommendations in order to develop an evolving list of informal learning websites. Based on a series of discussions, we compiled the resulting list of resources that are categorized into six areas. While each website was placed in only one of these six categories, there certainly is overlap in these dimensions. For instance, some social change resources also offer opportunities for virtual education, language education, or watching shared online video.

Despite the existence of overlap, we defined each of the six categories distinctly:

1. **Language learning** resources use technology-aided language learning with an integration of sound, voice interaction, text, video, and animation. It empowers self-paced interactive learning environments that enable learners to achieve learning outcomes without being restricted to place or time. Often, such environments involve numerous opportunities for participation users and

multiple methods for motivating their success. Online language learning often entails high levels of self-directed and reciprocal learning or supporting peer learning (see Ehsani & Knodt, 1998)

2. **Outdoor and adventure learning** is a hybrid online educational environment that provides students with opportunities to explore real-world issues through authentic learning experiences within collaborative online learning environments. Inquiry-based learning including teamwork, authentic data analysis, and project-based learning is encouraged (see Doering, 2006).
3. **Social change/global** resources seek to educate and inform people about issues and needs relating to social change, including poverty, hunger, AIDS, civics, the environment, etc. Technology is often used to create innovative ways to spread social good and access to learning worldwide. It is also used to empower and inspire people for the right cause.
4. **Virtual education** refers to learning environments where teacher and student are separated by time or space, or both. Course delivery can be through course management applications as well as various multimedia and Web 2.0 tools. Virtual education may be managed by organizations and institutions that have been created through alliances and partnerships to facilitate teaching and learning. Some virtual education websites provide learner services such as advising, learning assessment, and program planning (see Farrell & the Commonwealth of Learning, 2001). Our categorization and ratings are limited to virtual education resources that are available to individual learners at no cost.
5. **Learning portals** are centralized learning centers or repositories that contain an aggregation of educational information on a topic, often current or continually updated. Learners explore according to their own interest, time, and space. Learning portals support user and context learning, and are less centered on administration of that content and the results of the learning.
6. **Shared online video** includes any educational video (YouTube or other web-streamed videos) that can be watched or shared. Some such sites offer syndicated programming and professional documentaries or filmmaking, whereas others are supported by lay people. These sites often allow for interaction via comments and annotation. They often allow for downloading of content.

After synthesizing the literature, expertise, and specialists' reviews, we developed the final version of the evaluation criteria for such online informal learning resources. Those are: *content richness, functionality of technology, extent of technology integration, novelty of technology, uniqueness of learning environment/learning, potential for learning, potential for life-changing impact, and scalability of audience*. Table 1 provides definitions of evaluation criteria.

Table 1. *Definitions of Evaluation Criteria*

Criteria	Definition
Content Richness	This criterion indicates how much information the website, resource, or project contains on the topic chosen, how adequately it fulfills the purpose of learning, and whether the information is credible and up-to-date or not.
Functionality of Technology	This criterion indicates the ease of access, navigation, and use of the website, resource, or project and whether it contains effective and appropriately employed technology to serve the stated learning purpose.
Extent of Technology Integration	This criterion indicates the range, amount, and types of technologies employed, including issues of interaction, collaboration, and information collection, contribution, and development of community.
Novelty of Technology	This criterion indicates whether the website, resource, or project contains emerging, unusual, or novel technologies.
Uniqueness of Learning Environment / Learning	This criterion indicates whether the website, resource, or project serves the purpose of learning in a non-traditional, unique, or extreme learning environment, which is highly different from traditional classroom settings.
Potential for Learning	This criterion indicates whether the website, resource, or project enables and provides learning activities or learning opportunities for the target audience to achieve the intended learning goals.
Potential for Life-Changing Impact	This criterion indicates whether the website, resource, or project influences or improves the quality of life and extends or changes the perspective on the world for the intended audience.
Scalability of Audience	This criterion indicates the potential impact of the website, resource, or project including the possibility to broaden the size and scope of its potential intended audience.

Ratings were developed for each informal learning website through multiple phases of evaluation based on the eight criteria above using a 5-point Likert scale (1 is low; 5 is high). Four internal raters independently rated each informal learning resource using these eight criteria. Cronbach's alpha was performed to determine the internal consistency among the four raters. The overall alpha coefficient for the four raters was acceptable at .744. Appendix A shows the coding schemes.

Result and Discussion

General Findings

Four raters evaluated 305 websites using the rating scheme listed in Appendix A. The websites evaluated included the six categories or types of informal learning which we identified: 63 language learning, 51 outdoor and adventure learning, 57 social change and global learning, 57 virtual education, 38 learning portals, and 39 shared online video sites. Out of 5 points possible, Table 2 indicates that the shared online video category received the highest rating (3.25) across the eight categories. The high overall score implies excellent potential for effective learning from the shared online video resources that were evaluated. The social change and global learning category received the lowest (2.68) rating, meaning that there is lack of high quality learning materials for social change and global learning despite this area's significance.

To identify common patterns in the quality of online learning resources, we listed the top 25 websites out of a total of 305 websites by their average scores (see Table 3). There were four in the Language Learning category, four in Outdoor and Adventure

Learning, one in Social Change and Global Learning, nine in Virtual Education, one in Learning Portals, and six in Shared Online Video. Most of the high-scoring websites received top ratings for the functionality of the technology and the extent of technology integration. Such results reveal the importance of proper design of informal learning technology resources for educational purposes. In addition, among the eight criteria, content richness (4.11), functionality of technology (4.32), and potential for learning (4.17) are the highest-rated dimensions across all the informal learning websites evaluated in this study (see Table 4).

Table 2. *Evaluation of Website Categories Based on Informal Learning Criteria* *

Criteria	Categories (Number of websites)						Average (Total 305)
	Language Learning (63)	Outdoor / Adventure learning (51)	Social Change / Global (57)	Virtual Education (57)	Learning Portals (38)	Shared Online Video (39)	
1. Content Richness	2.9	2.9	2.5	3.4	3.2	3.4	3.05
2. Functionality of Technology	3.1	2.9	2.6	3.2	2.8	3.4	3.01
3. Extent of Technology Integration	2.9	2.8	2.6	3.1	2.7	3.2	2.86
4. Novelty of Technology	2.7	2.6	2.4	2.8	2.5	3.0	2.66
5. Uniqueness of Learning Environment / Learning	2.8	3.7	2.8	2.9	2.6	3.2	3.00
6. Potential for Learning	3.1	3.3	2.8	3.4	2.9	3.4	3.15
7. Potential for Life Changing Impact	2.6	3.1	2.9	3.1	2.5	3.1	2.90
8. Scalability of Audience	3.1	2.8	2.7	3.3	3.0	3.4	3.04
Average	2.89	3.01	2.68	3.15	2.76	3.25	2.96

*Rated with Likert scale 1(low)-5(high)

Findings with Criteria

Additional analyses were conducted based on the eight criteria. Table 2 shows that virtual education ranked highest in terms of the richness of its content: it received a ranking of 3.4. This ranking indicates that these websites were up-to-date and contained extensive learning materials. Not surprisingly, it is reasonable that the virtual education websites contain the most credible and up-to-date knowledge considering that many of the virtual education websites that we evaluated were managed by accredited academic institutions and used for formal learning as well as being available at no cost to individual learners.

Outdoor and adventure learning received the highest score in terms of the uniqueness of the learning environment and learning (3.7). This implies that the Website offers a novel way of learning; such forms of learning are not easily found in books or in traditional classrooms (Doering, 2006). High scores in this criterion signal that many non-traditional, unique, or informal learning environments are now possible.

In addition to these findings, it was also quite interesting to discover that across all the sites rated, the novelty of technology was deemed quite low (2.66). This result implies that emerging and cutting-edge technologies are not often employed for nontraditional educational purposes. Such findings also indicate that well-known

informal learning websites and resources fail to employ cutting-edge technologies. The use of emerging technologies—for example, mobile access today—might be beneficial in increasing accessibility for the public, including both teachers and learners. For the social change and global learning category, a vast majority of websites that the research team analyzed were simply composed of images and text materials. Despite this high-quality content, using a wider variety of communication technologies and interactive Web applications would likely increase the appeal to informal online learners.

Findings and Discussion by Categories

Results for each category of informal learning are provided below.

Language learning. Given that functionality of technology received the highest rating for language learning websites that we evaluated, technology interactivity and support seems to be one of the most valued factors in language education. The ratings for each of the eight criteria for the language learning category did not fluctuate much and averaged 2.89 overall. In the language education websites, the highest score was in the potential for learning (3.1), whereas the lowest score was in the potential for life changing experiences (2.63). Four language learning websites were rated among the top websites, including BBC Learning English, ChinesePod, EnglishPod, and Livemocha.

Outdoor and adventure learning. We also explored many websites addressing outdoor and environmental learning. This category tied with virtual education for the highest average overall score (3.01). The highest rated individual category for outdoor and adventure learning was the uniqueness of the learning environment (3.65) and the lowest score was for the novelty of technology (2.57). Considering that adventure learning involves authentic exploration, such as expeditions to the Himalayas or the Amazon rain forest, these findings are not too surprising, given the rich, authentic, and meaningful learning environments found in adventure learning. Four adventure learning websites were selected as top rated, including Earthducation, Explore, Jon Bowermaster, and Nautilus Live.

Social change and global learning. Most of the scores in the social change and global learning category were below the average scores across all the websites (i.e., 2.96). The highest score for social change and global education was in the potential for life change (2.93), which, naturally, was expected. These findings were attributed to the distinctive nature of the social change and global learning category. One of the common features of social change websites is providing inspiration and motivation, rather than directly providing educational materials. Only one website was selected as a top-rated Website in this category: iCivics.

Virtual education. Taking into consideration that many open learning resources include websites that are freely available and open to the public, such as the popular MIT OpenCourseWare (OCW) project, the high score in potential for learning (3.39) and content richness (3.39) for virtual education websites was not too surprising. We believe that the low score for the novelty of technology (2.82) was directly related to the fundamental role of virtual education in schools and universities today; most educational institutions tend to be conservative by nature. Nine Virtual Education websites that made their materials available free for individual learners were selected as top-rated. These sites included Ed Tech talk, John Hopkins OpenCourseWare, Khan Academy, MIT OCW, MIT OCW Highlights for High School, NASA for Educators, Open University

UK-OpenLearn, Coursera, and the Smithsonian. Clearly, virtual education is attracting much attention and providing many resources today.

Learning portals. We also rated the Web resources that were essentially learning portals. The highest score for learning portals was in content richness (3.19). The lowest score for the learning portals category was related to the novelty of the technology (2.49). Only one learning portal was selected as a top-rated website: MERLOT—a portal specifically designed and revamped since the late 1990s for sharing, rating, and discussing high quality online resources for higher education.

Shared online video. Many online lectures and programs are delivered through video channels and many high production news broadcasts are now available on the Web for millions of potential viewers. Such shared online video had the highest overall score (3.25). In terms of specific dimensional ratings, the highest-rated element for this category was the functionality of technology (3.41) and the lowest score was for the novelty of the technology utilized (3.00). Six shared online video websites were selected as top-rated across all the sites that were analyzed. These sites included Academic Earth, Discovery News Video, Explo.tv, Link TV, National Geographic Education, and Wonder How To Videos.

Table 3. *Top 25 Rated Learning Websites*

Categories	Websites
Language Learning	<ul style="list-style-type: none"> ▪ Livemocha (http://www.livemocha.com/) ▪ BBC Learning English (http://www.bbc.co.uk/worldservice/learningenglish/) ▪ EnglishPod (http://englishpod.com/) ▪ ChinesePod (http://chinesepod.com/)
Outdoor / Adventure learning	<ul style="list-style-type: none"> ▪ Earthducation (http://lt.umn.edu/earthducation/) ▪ Jon Bowermaster (http://www.jonbowermaster.com/) ▪ Nautilus Live (http://www.nautiluslive.org/) ▪ Explore (http://www.explore.org/)
Social Change / Global Learning	<ul style="list-style-type: none"> ▪ iCivics (http://www.icivics.org/)
Virtual Education	<ul style="list-style-type: none"> ▪ MIT OpenCourseWare (OCW) (http://ocw.mit.edu) ▪ MIT OpenCourseWare (OCW) Highlights for High School (http://ocw.mit.edu/high-school) ▪ Khan Academy (http://www.khanacademy.org) ▪ Open University UK-OpenLearn (http://www.open.uk/openlearn/) ▪ Ed Tech talk (http://edtechtalk.com/) ▪ John Hopkins OpenCourseWare (http://ocw.jhsph.edu/) ▪ NASA for Educators (http://www.nasa.gov/audience/foreducators/index.html) ▪ Coursera (https://www.coursera.org/) ▪ Smithsonian (http://www.si.edu/)
Learning Portals	<ul style="list-style-type: none"> ▪ MERLOT (http://www.merlot.org/merlot/index.htm)
Shared Online Video	<ul style="list-style-type: none"> ▪ National Geographic Education (http://education.nationalgeographic.com/education/) ▪ Academic Earth (http://academicearth.org/) ▪ Discovery News Video (http://news.discovery.com/videos/) ▪ Wonder How To Videos (http://www.wonderhowto.com/) ▪ Explo.tv (http://www.exploratorium.edu/tv/index.php) ▪ Link TV (http://www.linktv.org/)

Table 4. *Top 25 Websites According to Informal Learning Criteria and Category*

Criteria	Categories (Number of websites)						Average (Top 25)
	Language Learning (4)	Outdoor / Adventure Learning (4)	Social Change / Global (1)	Virtual Education (9)	Learning Portals (1)	Shared Online Video (6)	
1. Content Richness	3.94	3.63	4.50	4.22	5.00	4.17	4.11
2. Functionality of Technology	4.56	4.25	4.50	4.47	4.00	4.00	4.32
3. Extent of Technology Integration	4.19	3.94	4.25	4.03	4.00	3.79	3.99
4. Novelty of Technology	3.81	3.56	4.00	3.53	3.25	3.63	3.61
5. Uniqueness of Learning Environment / Learning	3.69	4.44	4.00	3.58	3.25	3.96	3.83
6. Potential for Learning	4.00	4.19	3.00	4.33	4.00	4.25	4.17
7. Potential for Life Changing	3.63	3.94	3.00	3.86	3.75	3.71	3.76
8. Scalability of Audience	4.13	3.56	3.50	4.36	4.25	3.92	4.05
Average	3.99	3.94	3.84	4.05	3.94	3.93	3.98

Conclusions and Implications

Many interesting characteristics of informal learning resources emerged from our analyses. In addition, our new eight-part coding scheme proved valuable in better understanding the learning potential of Web tools, materials, and resources that push toward the edges of informal forms of human learning today. These criteria should prove helpful to others intending to conduct research in this fast emerging field.

There are numerous factors to consider when designing effective websites for informal learning. Such variables include content and technological richness as well as the scalability, novelty, and uniqueness of the technology and the learning activities intended to take place. The incorporation of novel and emerging technologies also plays a role in the design and use of highly interactive resources from online language learning websites as well as almost any learning portal available today.

It is not surprising that virtual education was the highest rated in terms of content richness, potential for learning, and scalability. That is what such alternative educational services and learning providers intend to do. With economic factors to consider, virtual school and higher education curricula are often designed for large audiences; just witness the rise of massive open online courses (MOOCs) during the past several years. Of course, as detailed in the press, there is much money being spent by for-profit as well as non-profit and government entities in this space today (Kaya, 2010). As evident in the media, there is more demand for virtual forms of education today than ever before (Allen & Seaman, 2010; Project Tomorrow & Blackboard, 2011; Watson et al., 2011). As this occurs, there is increasing recognition that both traditional (i.e., residential) and online education, for credit or simply for expansion of learning, play important roles today (Milliron, 2010) and benefit learners from different backgrounds and circumstances.

In addition to these virtual education findings, many of the other results were somewhat anticipated. For instance, it makes sense that language learning sites incorporated the widest range of technology tools; many of them offer premium accounts which raise significant revenues. While there are ongoing concerns about some of the instructional approaches embedded in such online language learning sites (Clark & Gruba, 2010), we found many of these sites relatively easy to navigate, understand, and use.

At the same time, the most unique ways in which technology was employed were evident in the outdoor and adventure learning websites and resources as well as in the social change and global learning sites. Such findings would intuitively be expected from the adventure learning category given the motivational and emotional attraction of an adventure as well as the currency of activities and events found there.

Those hoping for a new career might explore virtual education as a potential life-changing event. Badges, certificates, and even fully online degrees can be obtained today. Clearly, virtual education sites also offer the most in terms of both the range and amount of human learning experiences available. There are assorted learning options or paths once one enrolls in or browses through virtual education resources.

With the plethora of educational resources available online for free, it is essential to identify appropriate and high-quality learning resources to maximize the learning process. Those learning in a self-directed manner need tools and a framework to discern the quality and appropriateness of such resources. We admit that the tool we developed needs additional testing and empirical validation for further advancement. With informal and self-directed learners in mind, we hope that the tool will serve as a starting point for better understanding and appreciating informal as well as formal online learning resources and possibilities.

The results of this research will help expose lifelong learners, teachers, students, instructional designers, administrators, and other educational stakeholders to a wealth of learning resources and tools for both formal and informal education. The open educational world is expanding in many directions to offer unique learning paths and opportunities, from simple information gathering in Wikipedia to timely and engaging shared online videos that remediate or supplement learning (Khan, 2010; Pan et al., 2012) to high production news broadcasts. As we have seen, there are now highly engaging learning adventures from science stations in Antarctica to remote parts of the Arctic north (Associated Press, 2011; Carter, 2010). At the same time, there are learning portals, news resources, and other information and media for nearly every significant scientist, writer, politician, and musician throughout recorded history as well as for every species of life found on this planet (Managhan, 2011).

Those developing such portals and related websites need to better grasp the key technology integration factors and learning activities that can maximize users' learning. This awareness is increasingly pivotal for the learners around the planet; technologies will continue to appear each year that can advance formal as well as informal learning opportunities. At the same time, millions of additional people are obtaining access to the Web each month. They will undoubtedly be relying on such resources for their daily and lifelong learning needs, especially those learners who lack access to high quality formal education.

Given such trends, those using these informal learning tools and resources need to better grasp their learning potential. We will be collecting stories during the coming years that will serve as models or examples of the types of learning that are now possible in the twenty-first century. This project was just the first pass through hundreds of informal learning resources. It is one marker or indicator of learning now possible. Our next research phases will push and probe much more deeply into the motivational and human development possibilities that now lie within our grasp.

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ANALYZING WEBSITES FOR INFORMAL LEARNING

Appendix A. Informal Learning Web Site Coding Scheme

Criterion 1. Content Richness

This criterion indicates how much information the website, resource, or project contains on the topic chosen, how adequately it fulfills the purpose of learning, and whether the information is credible and up-to-date.

1 (Low)	2	3 (Medium)	4	5 (High)
The Website, resource, or project doesn't contain much information on the topic chosen, and doesn't adequately fulfill the purpose of learning. The information is not credible or is out-of-date. There are few resources providing access to learning content; it may appeal to different learning preferences or styles.	-	The Website, resource, or project contains less information on the topic chosen, and fulfills the purpose of learning to some extent. The information is somewhat credible or is up-to-date. There are some resources providing access to learning content; it may appeal to different learning preferences or styles.	-	The Website, resource, or project contains much information on the topic chosen, and adequately fulfills the purpose of learning. The information is credible and up-to-date. There are a wide range of resources providing access to learning content; it may appeal to different learning preferences or styles.

Criterion 2. Functionality of Technology

This criterion indicates with the ease of access, navigation, and use of the website, resource, or project and whether it contains effective and appropriately employed technology to serve the stated learning purpose.

The Website, resource, or project is difficult to access, navigate, and use and contains ineffective technology for the stated learning purposes of potential users.	-	The Website, resource, or project is relatively intuitive or easy to access, navigate, and use and contains somewhat effective and appropriately employed technology to serve the stated learning purposes of potential users.	-	The Website, resource, or project is extremely intuitive and easy to access, navigate, and use and contains highly effective and appropriately employed technology to serve the stated learning purposes of potential users.
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Criterion 3. Extent of Technology Integration

This criterion indicates the range, amount, and types of technologies employed including issues of interaction, collaboration, and information collection, contribution, and community through such technology.

The Website, resource, or project contains few technologies for learning. Technology tools are not interactive, collaborative, or participatory and do not promote communication or sense of community. User contribution is limited or nonexistent.	-	The Website, resource, or project contains some range of technologies for learning. Technology tools are moderately interactive and collaborative and might enhance information exchange or user communication and contribution.	-	The Website, resource, or project contains a wide range and amount of technologies for learning. Technology tools are highly interactive and collaborative and can greatly promote information collection and dissemination as well as user communication and contribution.
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Criterion 4. Novelty of Technology

This criterion indicates whether the website, resource, or project contains emerging, unusual, or novel technologies.

There is no experimentation with emerging, unusual, or novel technologies for learning and the technologies which are used are out-of-date.	-	There is some experimentation with emerging, unusual, or novel technologies for learning which might motivate or engage potential users/learners.	-	There is extensive experimentation with emerging, unusual, or novel technologies for learning; some of which is quite exciting, motivating, or appealing for potential users/learners.
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ANALYZING WEBSITES FOR INFORMAL LEARNING

Criterion 5. Uniqueness of Learning Environment / Learning

This criterion indicates whether the website, resource, or project serves the purpose of learning in a non-traditional, unique, or extreme learning environment, which is highly different from traditional classroom settings.

<p>The Website, resource, or project is just a replication of formal or traditional school-based learning. The learning is essentially what the user or learner might experience in a traditional teaching or training situations. The Website, resource, or project might be rather plain or unappealing to the potential learner or user; it is one of dozens of such sites.</p>	-	<p>The Website, resource, or project is somewhat unique or different from traditional learning. There are learning opportunities that are somewhat novel or hard to find in formal or traditional settings. The Website, resource, or project makes an attempt to connect people to each other as well as to novel resources and activities and current information not easily found in books or other traditional learning resources. There is also some room for creative expression of the users.</p>	-	<p>The Website, resource, or project is unique or different. There are learning opportunities that are novel or hard to find in formal or traditional settings. The Website, resource, or project connects people to each other as well as to novel resources and activities and current information is not easily found in books or other traditional learning resources. There is also extensive room for creative expression of the users.</p>
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Criterion 6. Potential for Learning

This criterion indicates whether the website, resource, or project enables and provides learning activities or learning opportunities for the target audience to achieve the intended learning goals.

<p>The Website, resource, or project enables and provides few learning activities or opportunities for the target audience to achieve the intended learning goals. There are extremely limited markers, targets, or goals for such learning and limited acknowledgment related to those who have completed one or more learning-related units, activities, or segments (i.e., self-tests, discussions, reviews, interactions, etc. or various rich media resources). The paths for each learner may be not unique. There may be few ways to socially network or collaborate with others at the Website, resource, or project.</p>	-	<p>The Website, resource, or project enables and provides some learning activities or learning opportunities for target audience to achieve some intended learning goals. There might be some markers, targets, or goals for such learning as well as celebration of those who have completed one or more learning-related units, activities, or segments (i.e., self-tests, discussions, reviews, interactions, etc. or various rich media resources). The paths for each learner may be somewhat unique. There may also be some ways to socially network or collaborate with others at the Website, resource, or project.</p>	-	<p>The Website, resource, or project enables and provides the potential for learning activities or learning opportunities for the target audience to achieve most or all of the intended learning goals. There might be markers, targets, or goals for such learning as well as celebration of those who have completed one or more learning-related units, activities, or segments (i.e., self-tests, discussions, reviews, interactions, etc. or various rich media resources). The paths for each learner may be highly unique. There may also be ways to socially network or collaborate with others at the Website, resource, or project.</p>
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ANALYZING WEBSITES FOR INFORMAL LEARNING

Criterion 7. Potential for Life-Changing Impact

This criterion indicates whether the website, resource, or project influences or improves the quality of life and extends or changes the perspective on the world for the intended audience.

The Website, resource, or project does not offer much in the way of improving or influencing the quality of life or the perspective of the world for the intended audience. The impact is quite narrow or limited. Users might not gain anything beyond basic skills.	-	The Website, resource, or project somewhat influences or improves the quality of life and the perspective of the world for intended audience. People are somewhat empowered to learn in ways that change their lives or broaden their outlook, perspectives, or knowledge and competencies. They can connect to other people or to knowledge and information in some ways that they might not have felt or experienced previously.	-	The Website, resource, or project significantly influences or improves the quality of life and extends or changes the perspective of the world for the intended audience. People are empowered to learn in ways that change their lives or broaden their outlook, perspectives, or knowledge and competencies. They can connect to other people or to knowledge and information in many ways previously unseen or seldom experienced.
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Criterion 8. Scalability of Audience

This criterion indicates the potential impact of the website, resource, or project including the possibility to broaden the size and scope of its potential intended audience.

The Website, resource, or project has a narrow focus or does not have wide appeal or potential impact. The intended or actual audience is quite limited.	-	The Website, resource, or project has the potential to impact many people or a somewhat wide audience. It might have relevance to several different audiences or types of users.	-	The Website, resource, or project has high possibility to impact a broad audience or large scale and scope from one or more educational sectors (e.g., K-12, higher education, corporate, government, non-profit, or informal).
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SELF-EFFICACY TO DO OR SELF-EFFICACY TO LEARN TO DO: A STUDY RELATED TO PERSEVERANCE

Michael K. Ponton, Paul B. Carr, and Nancy R. Wiggers

Bandura (1995) asserted that “efficacy beliefs play a vital role in the development of self-directed lifelong learners” (p. 17). This descriptive study sought to determine if perseverance in performances without a history of success are more likely due to beliefs of self-efficacy in the performance itself or to beliefs of self-efficacy to learn the performance. This is a conceptual nuance not previously investigated in self-efficacy research. Findings suggest that self-efficacy to learn is as important as self-efficacy to do with respect to perseverant behavior in unmastered activities despite repeated failures.

The enactment of novel pursuits is a common characteristic of human agency (i.e., intentional action). Both the advancement of a technological society as well as the creation of a self-fulfilling life depend upon self-selecting new courses of action that build upon previously acquired knowledge and skills. Due to the novelty of such pursuits, learning is a requisite component in achieving mastery and ultimate success. In addition, the self-selecting aspect of novel pursuits often requires the agent (i.e., the person exhibiting agency) to engage in self-directed learning where “*self-directed* learning represents the degree to which personal agency is exercised individually by directing the creation of ... [learning] activities” (Ponton, 2009, p. 65).

According to social cognitive theory, the most central percept in defining and shaping human agency is self-efficacy (Bandura, 1986). Courses of action are chosen and persevered in dependent upon self-appraisals of personal capability to muster strategies perceived as necessary for success (Bandura, 1997). When engaging in a novel pursuit, self-efficacy appraisals may include not only the ability to engage in the activity itself (i.e., “self-efficacy to do”; presently labeled *performing self-efficacy*) but also the ability to learn how to engage in the activity (i.e., “self-efficacy to learn to do”; presently labeled *learning self-efficacy*). The purpose of this paper is to differentiate the import of these two appraisals as they relate to perseverant behavior in unmastered activities despite failed attempts.

Conceptual Framework

Bandura (2001) asserted the following:

Efficacy beliefs are the foundation of human agency. Unless people believe they can produce desired results and forestall detrimental ones by their actions, they have little incentive to act or to *persevere* [emphasis added] in the face of difficulties. Whatever other factors may operate as guides and motivators, they are rooted in the core belief that one has the power to produce effects by one's actions. (p. 10)

Self-efficacy refers to a personal belief that one has the capability “to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3). In this regard, self-efficacy is not a mere inventory of existing knowledge and skills but rather is “perceived operative capability” (Bandura, 2007, p. 646); that is, self-efficacy is based upon a personal appraisal of what one is able to do with whatever resources one can make available. As a belief, self-efficacy is not a simple reflection of objective assessments that measure skills of organization and execution but rather is developed through personal interpretations of efficacy information; thus, self-efficacy is a self-perception and must be measured as such.

In general, humans do not choose to engage in activities that they perceive as ineffectual in producing desirable outcomes; thus, much of human activity is cognitively motivated due to our capability of forethought but mediated by personal appraisals of efficacy (Bandura, 1986, 1997). Social cognitive theory recognizes three categories of outcomes—social (e.g., money, praise, ostracism), personal (e.g., pleasure, pain), and self-evaluative (i.e., congruence to personal standards)—that represent consequences to performances (Bandura, 1997). Agents choose activities and adopt performance goals based not only upon the perceived relationship to obtaining desirable outcomes or avoiding aversive ones but also upon whether or not perceived capability exists to muster a successful performance (Bandura, 1997).

Self-efficacy has been an explicit part of the self-directed learning literature for approximately 20 years (See Bloyd, Hoban, & Wall, 1995; Hoban & Hoban, 2004; Ponton, Carr, Schuette, & Confessore, 2010; Ponton, Derrick, Confessore, & Rhea, 2005; Ponton, Derrick, Hall, Rhea, & Carr, 2005; Wall, Sersland, & Hoban, 1996). Hoban and Hoban (2004) stated the following: “The work of so many of those who have applied the concept of self-efficacy to learning confirms Bandura's postulation of the link between self-efficacy and self-directed learning. That seems undeniably clear” (p. 21). More recent empiricism (Ponton, Carr, et al., 2010) and theorizing (Ponton, 2009) continue to support the assertion that “efficacy beliefs play a vital role in the development of self-directed lifelong learners” (Bandura, 1995, p. 17). Quite simply, an individual will not choose to engage in a self-directed learning activity or, subsequently, persevere in one in the face of failed attempts unless that person believes that he or she possesses the capability to successfully execute such a learning activity.

There are four primary sources of efficacy information: mastery experiences, verbal persuasion, vicarious experiences, and physiological/emotive arousals (Bandura, 1977). In general, mastery experiences foster percepts of efficacy when successful

performances are attributed to personal capability. In addition, verbal assurances of capability provided by credible others can strengthen efficacy. Observing the modeled capabilities of similar others provides a vicarious mechanism that may also increase one's belief in personal abilities. Finally, interpretations of somatic feedback resulting from a performance may strengthen efficacy if such arousals are interpreted as epiphenomenal to the activity and a natural accompaniment to expanding capability. However, regardless of the source of information,

it is the agent and not some external evaluator who reflects upon the varied forms of efficacy information and arrives at a resultant efficacy belief – self-efficacy is perceived capability developed subjectively through one's cognitive filters, not some objectified assessment of capability. (Ponton, 2009, p. 72)

Note that “self-efficacy is a domain specific assessment” (Ponton, Derrick, Confessore, & Rhea, 2005, p. 86); that is, personal capabilities are appraised to varying degrees based upon each separate activity under scrutiny. For example, it is an entirely different efficacy appraisal regarding one's ability to drive a car versus one's ability to learn how to drive a car. For unmastered activities and in the face of failed attempts, there would seemingly be authentic indicators of a lack of capability that logically might weaken performing efficacy (i.e., self-efficacy to do); therefore, perseverance would suggest a strong sense of learning efficacy (i.e., self-efficacy to learn to do). Thus, *we hypothesize that perseverant behavior is highly dependent upon an agent's belief in his or her ability to learn to perform the unmastered pursuit.* In order to fully understand perseverant behavior, domain-correct appraisals of efficacy must be studied.

Procedures

Instrumentation

We developed the Appraisal of Differential Efficacy (ADA; see Appendix) to assess the comparative importance of performing self-efficacy (i.e., self-efficacy to do) versus learning self-efficacy (i.e., self-efficacy to learn to do) with respect to perseverant behavior in an unmastered activity and in the face of failed attempts. “Efficacy beliefs should be measured in terms of particularized judgments of capability that may vary ... under different situational circumstances” (Bandura, 1997, p. 42); thus, the construction of the four efficacy items adhered to a format of providing a situation with varying sources of efficacy information followed by fixed response choices designed to uncover the comparative importance of both forms of efficacy. Each of the four efficacy items attended to the four sources of efficacy information as follows:

- Item 1 focused solely on the lack of a mastery experience;
- Despite the lack of a mastery experience, Item 2 included the provision of a positive verbal persuasion;
- Despite the lack of a mastery experience, Item 3 included the provision of a positive vicarious experience; and

- With the lack of a mastery experience, Item 4 included the provision of a negative physiological or emotive arousal.

As this was an exploratory study, we wanted a simple instrument to provide some indication as to the differential import of both percepts of self-efficacy—performing versus learning—not only when there is no information to strengthen performing self-efficacy beliefs (i.e., Items 1 and 4) but also when there is such information (i.e., Items 2 and 3); however, in all items the most authentic indicator of performing self-efficacy—a mastery experience—is lacking in the initiation of the activity (“engaged in an activity in which you have never performed successfully in the past”) and in its continued enactment (“persist in overcoming failed attempts”).

“The item content of self-efficacy scales must represent beliefs about personal abilities to produce specified levels of performance” (Bandura, 1997, p. 45); thus, the fixed response choices explicitly attend to these guidelines and support construct validity by incorporating measures of belief (“I believe”), personal ability (“I am able to”), and specific level of performance (“perform the activity successfully”). In addition, “to achieve explanatory and predictive power, measures of personal efficacy must be tailored to domains of functioning”; construct validity is again supported by the phrases “able to perform” and “able to learn how to perform” that differentiate performing and learning efficacy, respectively. Note that self-efficacy scales rely on construct validation to a great degree (Bandura, 1997). The participant is asked to select the self-efficacy appraisal that “best describes” perseverant behavior in order to provide an indication as to the differential import of both percepts of self-efficacy. We believe the ADE is face valid in that we purport the measure associated with each item to be consistent with its construction and underlying theoretical framework.

The Flesch-Kincaid Grade Level of the ADE is 6.1 (as per Microsoft Word 2013 analysis). The first author administered the ADE to all participants completing the paper version; none of these 46 participants expressed any confusion with respect to understanding any aspect of the instrument.

Sample

The population of interest was adults (i.e., minimum age of 18 years). Because a random sample of this population could not be targeted and accessed, data from various samples of convenience were collected ($N = 102$) in order to perform the study (cf. Gall, Gall, & Borg’s, 2007, p. 175, justification for convenience sampling). The participants were targeted to produce variation in age and education as these characteristics likely provide efficacy information in the two domains of interest (i.e., performing and learning) due to associated experiences. The majority were female ($n = 69$; $P = 67.6\%$) and the levels of education were as follows: high school diploma/G.E.D., $n = 48$, $P = 47.1\%$; bachelor’s degree, $n = 12$, $P = 11.8\%$; and graduate/professional degree, $n = 42$, $P = 41.2\%$. The largest age range represented by the sample was 18-22 ($n = 48$; $P = 47.1\%$; see Table 1). Note that 46 participants completed the paper version of the ADE (see Appendix) that allowed for the submission of age in years, whereas 56 participants completed an online version of the

ADE that provided age ranges corresponding to Table 1; thus, the 46 exact ages submitted were converted to the age ranges presented.

Table 1. *Age Ranges of Participants*

Age Range	<i>n</i>	<i>P</i>
18-22	48	47.1
23-27	7	6.8
28-32	7	6.8
33-37	8	7.8
38-42	11	10.8
43-47	5	4.9
48-52	6	5.9
53-57	5	4.9
58-62	3	2.9
63-67	1	1.0
68-72	0	0.0
73-77	1	1.0

Findings

Tables 2 through 5 present the findings associated with ADE Items 1 through 4, respectively. Margins of error assume large populations (Creative Research Systems, 2012). Statistically significant differences in percentages relative to performing efficacy (i.e., Response a) were calculated (Vassar College, n.d.).

For all four items, participants indicated that perseverance is based upon equal strengths of performing and learning self-efficacy to a greater degree than merely performing self-efficacy; for three items (Item 2 excluded; see Table 3), participants indicated that perseverance is based upon learning self-efficacy to a greater degree than merely performing self-efficacy. Thus, the research hypothesis that learning self-efficacy is as important in perseverant behavior as performing self-efficacy is supported; for three items, learning self-efficacy is more important than performing self-efficacy.

Table 2. *Item 1 - Lack of Mastery Experience*

Response Option	<i>n</i>	<i>P</i>	Margin of Error ^a
a. I believe I am able to perform the activity successfully	11	10.8	6.0
b. I believe I am able to learn how to perform the activity successfully	46	45.1 ^b	9.7
c. I believe a and b equally	44	43.1 ^b	9.6
d. I do not believe a or b	1	1.0	1.9

^aFor CI₉₅ assuming a large population. ^bDifferent from Response a at the nondirectional .0001 level.

Table 3. *Item 2 - Lack of Mastery Experience With Positive Verbal Persuasion*

Response Option	<i>n</i>	<i>P</i>	Margin of Error ^a
a. I believe I am able to perform the activity successfully	19	18.6	7.6
b. I believe I am able to learn how to perform the activity successfully	32	31.4	9.0
c. I believe a and b equally	51	50.0 ^{b,c}	9.7
d. I do not believe a or b	0	0.0	n/a

^aFor CI₉₅ assuming a large population. ^bDifferent from Response *a* at the nondirectional .0001 level. ^cDifferent from Response *b* at the nondirectional .05 level.

Table 4. *Item 3 - Lack of Mastery Experience With Positive Vicarious Experience*

Response Option	<i>n</i>	<i>P</i>	Margin of Error ^a
a. I believe I am able to perform the activity successfully	19	18.6	7.6
b. I believe I am able to learn how to perform the activity successfully	36	35.3 ^b	9.3
c. I believe a and b equally	46	45.1 ^c	9.7
d. I do not believe a or b	1	1.0	1.9

^aFor CI₉₅ assuming a large population. ^bDifferent from Response *a* at the nondirectional .025 level. ^cDifferent from Response *a* at the nondirectional .0005 level.

Table 5. *Item 4 - Lack of Mastery Experience With Negative Physiological or Emotive Arousal*

Response Option	<i>n</i>	<i>P</i>	Margin of Error ^a
a. I believe I am able to perform the activity successfully	11	10.8	6.0
b. I believe I am able to learn how to perform the activity successfully	44	43.1 ^b	9.6
c. I believe a and b equally	37	36.3 ^b	9.3
d. I do not believe a or b	10	9.8	5.8

^aFor CI₉₅ assuming a large population. ^bDifferent from Response *a* at the nondirectional .0001 level.

Discussion

The major threat to internal validity was the use of new instrumentation; however, the internal consistency of the findings for the four separate efficacy situations presented provides evidence that the interpretation of the results is consistent with the instrument's proposed purpose to measure differential efficacy (cf. Creswell, 2015, p. 158, regarding instrument validity). The major threat to external validity was the nonprobability sample of adults measured; thus, the following conclusions,

implications, and recommendations may not be generalizable to the entire adult population.

The present findings suggest that perseverance in unmastered activities despite failed attempts is heavily dependent upon the agent's learning self-efficacy rather than merely performing self-efficacy. This is true even in the presence of information (via verbal persuasion and vicarious experiences) that may enhance performing efficacy. The implication of this finding is that we, as educators, must move toward developing people who believe strongly in their ability to learn challenging, novel content.

It is not enough to expect that learning successes demonstrated by objective assessments will be reflected as stronger efficacy beliefs for learning; this is an overly simplistic view of enactive mastery experiences (cf. Bandura, 1997). Self-efficacy is a self-perception and, as such, is influenced by cognitive processes developed through reflections of varied sources of efficacy information amassed over time; thus, preexisting percepts of efficacy influence how new efficacy information is processed. Learning successes may raise, not change, or even diminish percepts of self-efficacy depending upon how the person interprets this new information through existing cognitive biases (Bandura, 1997).

By exerting too much control, an educator may reduce the potential for learning experiences to strengthen students' learning efficacy. In order to promote a student's self-efficacy to learn, the educator must understand to what degree complex learning activities need to be simplified in order to provide sufficient challenges that strengthen percepts of coping strategies related to learning. The educator must decide what constitutes a "sufficient" challenge based upon an understanding of the student's capabilities and similar others at the same developmental stage. Mastery experiences that strengthen learning efficacy should be difficult but accomplishable tasks that require (a) the use of extant cognitive and metacognitive strategies in novel activities to overcome learning challenges, (b) personal goal setting coupled with assessments that highlight incremental growth and expanding development of individual knowledge and skills, and (c) self-reliance that provides an opportunity for the student to attribute learning successes to personal efficacy rather than nonability factors such as a good teacher or excellent resources.

Coupled with enactive mastery experiences, educators should provide persuading feedback that validates to the student his or her ability to learn new knowledge and acquire new skills. Typically armed with assessed indicators of growth, educators are in a good position to convey to students that personal capabilities to learn novel, challenging content are expanding. Armed with similar information from mastery experiences, students are in a good position to evaluate the accuracy of such feedback and, thus, the credibility of the persuaders, thereby affecting the ability of these persuaders to strengthen students' learning efficacy via expressed appraisals. In general, learning efficacy is enhanced when learning successes are associated with expanding capabilities rather than dint of effort; in fact, to convey that success is greatly related to hard work suggests effort is required to offset a lack of ability, thereby possibly weakening efficacy appraisals (Bandura, 1997). Therefore, educators should provide persuasive feedback grounded in accurate diagnoses of accomplishment

and couched in terms of a student's expanding capability to learn in order to strengthen learning self-efficacy.

To spawn continued growth by tackling even greater learning challenges such as those likely represented by novel pursuits, persuaders should also provide efficacy appraisals in moderate excess of current capabilities to facilitate greater attainments "through better strategy selection and extra effort ... [without a great risk of failure that may] undermine the diagnostic credibility of the persuaders and further reinforce performers' belief in their inherent limitations" (Bandura, 1997, p. 105). Human achievement and increased capability are rooted in successful endeavors that stretch current capacities. Such endeavors are typically chosen when personal appraisals of capability exceed actual capability—at least to some degree; consequently, the actual capability is then enhanced due to the accomplished performance.

People often appraise their capabilities based upon social comparisons, particularly when little if any direct experiences are present; thus, efficacy is appraised via vicarious experiences in which the competency of similar others is observed, assessed, and projected onto the observer (Bandura, 1997). Educators should identify models who are as similar as possible to current students but possess greater capabilities and then create learning activities that allow the students to observe the models' successful strategies. The assessment of similarity should be based upon attributes (e.g., similar in appearance) as well as ability (e.g., similar or slightly more talented; avoid high-achieving models who have talents that far exceed observers thus creating humbling social comparisons that may weaken an observer's efficacy). Models should fulfill an instructional role so that observers can develop skills and strengthen percepts of efficacy in manageable pursuits facilitated by identifying with the model and then observing the model's capabilities, expressed thought patterns, and associated achievements. Models should be chosen not based solely upon similarities but also with respect to being encouragers of success; chosen in this manner, models will support not only attentional, retentional, and production processes necessary for observational learning to occur but also requisite motivational processes via verbal encouragement (cf. Bandura, 1986). In our current technological age, models do not have to be physically present. Models can interact with observers symbolically via visual media as they "convey rules for generative and innovative behavior ... [by verbalizing] their thought processes and strategies aloud as they engage in problem-solving activities" (Bandura, 1997, p. 93); thus, adequate models may be incorporated into instruction with few geographic limitations.

Physiological and emotive arousals resulting from performances also represent a source of efficacy information. Like the other three sources discussed, the effect of this information on percepts of efficacy is not direct; it is mediated by cognitive processing. Educators can help students to use this information in efficacy-building ways by influencing how somatic feedback is interpreted. Sociocognitive theory suggests that "knowledge about bodily states is acquired, in large part, through social labeling coordinated with experienced events" (Bandura, 1997, p. 107; cf. Bandura, 1986); thus, educators can play a role in this labeling process. Whether it is feedback associated with strength from a physical activity (e.g., body aches, fatigue) or associated with discomfort from an emotionally tense situation (e.g., elevated pulse

rate, sweating), such arousals are likely to occur even though they may be unobservable. Thus, educators should recognize the likelihood of such feedback and proactively work toward helping students to interpret such reactions as just the natural course of events when new knowledge or skills are being developed.

Educators should also be careful not to create activities that are so daunting as to elicit extreme somatic reactions, thereby diminishing the opportunity for both success and the strengthening of efficacy. The educator must decide an appropriate level of challenge based upon an understanding of the student's capabilities as well as observed somatic feedback. In addition, educators can help students to focus on the activity at hand instead of physiological or emotive arousals. Consequently, students can increase the probability of a successful performance through increased attention on the performance itself, thereby facilitating increases in capability and stronger percepts of efficacy. By proactively fostering efficacy-promoting interpretations of somatic arousals, learning facilitators could greatly reduce the need for cognitive reframing (i.e., changing how students currently interpret such arousals).

Concluding Remarks

If the motivation to pursue a novel activity were solely dependent upon an agent's self-efficacy to perform the activity itself, then it would be up to the agent to strengthen self-perceptions of ability using extant sources of efficacy information. The findings of the present study suggest that in comparison to self-efficacy with respect to the performance, self-efficacy to learn the performance is equally important, if not more important, to motivate perseverant behavior in the face of failed attempts. One's efficacy beliefs about learning provide a measure of control within challenging contexts (i.e., novel pursuits) that often include failed attempts on the path to mastery. Persons efficacious in learning are better able to cope with failed attempts by perceiving each failure as a means to diagnose weaknesses, reevaluate and revise action plans, and try again. For example, an athlete who perseveringly seeks out improvement using coaches, models, and personally acquired information does so with the belief that he or she has the ability to learn how to perform in the chosen sport.

This finding represents a great opportunity for educators to influence the human pursuit of unmastered activities by strengthening students' learning efficacy. Educators should attend to the four sources of efficacy information in constructing learning activities that facilitate learning and build a strong sense of efficacy to learn challenging content. Such efficacy will empower students to pursue novel activities that promote higher levels of personal development and satisfaction. In addition, theorists should also consider these findings, as they suggest a necessity to incorporate both performing and learning efficacy instruments in research in order to maximize the explanatory and predictive power of measured constructs used to understand human performance.

Initiatives at the institutional level should also be developed to promote the strengthening of students' efficacy to learn. Developmental programs can help educators—professional teachers/administrators or nonprofessionals such as teaching assistants and student peers—to understand the theory of the proposed efficacy-building activities and their instructional applications; note that educators must also

possess a strong sense of efficacy to engage in this type of instruction in order to maximize their motivation and effectiveness in doing so. In particular, peer-assisted learning (e.g., supplemental instruction, peer tutoring) should be designed to take full advantage of the opportunity for vicarious experiences to strengthen students' perceptions of self-efficacy via social modeling. All these initiatives will help to foster an institutional culture that supports and encourages efficacy-building transactions between educators and students.

People exert considerable influence over the courses that their lives take. Their personal values, interests, and appraisals of capability are informed by experiences and interactions with environmental circumstances. Drawing upon these informational resources, they individually decide novel pursuits that cause considerable divergences between individual life trajectories. It is not uncommon to experience failures in performing novel pursuits, as they can challenge existing competencies, thereby requiring additional knowledge or skills. Previous theoretical arguments have suggested that perseverance in the face of failed attempts is dependent upon a strong sense of efficacy in the performance itself; however, the present study suggests an equal, if not more important, dependence upon a strong sense of efficacy to learn the performance. Because novel pursuits may require novel learning activities, perseverance in self-chosen pursuits may be strongly dependent upon an agent's efficacy to engage in self-directed learning. Further research is needed to provide support for this assertion.

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Appendix

Appraisal of Differential Efficacy – Paper Version

For items 1 through 4, please circle the letter of the response that best describes you:

1. When engaged in an activity in which you have never performed successfully in the past, which of the following best describes why you persist in overcoming failed attempts:

- a. I believe I am able to perform the activity successfully.
- b. I believe I am able to learn how to perform the activity successfully.
- c. I believe a and b equally.
- d. I do not believe a or b.

2. When engaged in an activity in which you have never performed successfully in the past but that someone whose opinion you value tells you that you can perform the activity successfully, which of the following best describes why you persist in overcoming failed attempts:

- a. I believe I am able to perform the activity successfully.
- b. I believe I am able to learn how to perform the activity successfully.
- c. I believe a and b equally.
- d. I do not believe a or b.

3. When engaged in an activity in which you have never performed successfully in the past but that you notice that someone who is very much like you can perform the activity successfully, which of the following best describes why you persist in overcoming failed attempts:

- a. I believe I am able to perform the activity successfully.
- b. I believe I am able to learn how to perform the activity successfully.
- c. I believe a and b equally.
- d. I do not believe a or b.

4. When engaged in an activity in which you have never performed successfully in the past and that causes you either physical or emotional discomfort when engaged in the activity, which of the following best describes why you persist in overcoming failed attempts:

- a. I believe I am able to perform the activity successfully.
- b. I believe I am able to learn how to perform the activity successfully.
- c. I believe a and b equally.
- d. I do not believe a or b.

Please provide the following information:

- a. Gender (circle one): Male Female
- b. Age in years (enter number): _____
- c. What is the highest diploma or degree you have earned (circle one)?
High school diploma or GED Bachelor's degree Graduate degree

SELF-DIRECTION IN LEARNING AND ACADEMIC MOTIVATION DEVELOPMENT IN UNDERGRADUATE HEALTH PROFESSION STUDENTS

Shelley S. Payne, Joan Rocks, Barbara Schaffner

Future medical practitioners must have learning skills that enable them to be effective life-long learners. A longitudinal, descriptive study was used to examine the readiness for self-directed learning over the course of an academic curriculum for undergraduate nursing and athletic training students. Learner self-direction and self-determination were identified through the use of two instruments, the Personal Responsibility Orientation to Self-Direction in Learning Scale (PRO-SDLS) and the Academic Motivation Scale (AMS- reported as Self-Determination Index (SDI)). Scores on both instruments were collected in each academic year once students were accepted into their respective programs. Nursing students ($n = 41$) experienced a drop in PRO-SDLS scores between the first and second year and an increase from year 2-3 of the program, but their mean PRO-SDLS scores never recovered to initial values. Athletic training ($n = 9$) students increased their mean values for the PRO-SDLS scores each academic year. No appreciable change was noted for the SDI scores within students. Results warrant the use of the PRO-SDLS to assess self-directed learning in health profession students.

It is the goal of entry-level education programs in the health professions to prepare students for competent practice in the ever-changing world of healthcare. It is therefore critical that educators enable students to take what is learned in the classroom and apply it to the demands of clinical practice. Educators in undergraduate health profession programs such as Athletic Training and Nursing have had to respond to competency-based standards that demand entry-level practitioners in their respective professions be well adapted for life-long learning. It is this process of life-long, self-directed learning that will enable graduates of baccalaureate level health profession programs to remain current in their application of evidence-based care (Simon & Aschenbrener, 2005).

Concurrently, there is a movement among all health professions to also practice evidence-based care. Professionals who are charged with making healthcare decisions

in light of the most current literature must be armed with the skills to formulate their own professional learning goals, assess their knowledge needs, and carry out a learning plan to achieve the desired outcomes (Healey, 2008; Huynh et al., 2009; Shokar, Shokar, Rowers, & Bulik, 2002). This skill set is often described as self-directed learning readiness (SDLR) (Guglielmino, 1978; Huynh et al., 2009; Kell, 2006; O’Shea, 2003). Knowles (1975), an early advocate of self-directed adult learning, defined self-directed learning (SDL) as:

a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p. 18)

The skills associated with the concept of self-directed learning will enable students equipped with those attributes to successfully meet the demands of a constantly changing profession (Healey, 2008). Brockett and Hiemstra (1991) felt that although Knowles clearly represented the “instructional method processes (self-directed learning)” (p. 26), his definition lacked some element that represented the “personality characteristics of the individual learner (learner self-direction)” (p. 26). Therefore, they proposed the personal responsibility orientation (PRO) model of self-direction in learning in which the context of the learning environment and the characteristics of the learners themselves both contribute to the development of self-direction (Brockett & Hiemstra, 1991). The Personal Responsibility Orientation to Self-Direction in Learning Scale (PRO-SDLS) was thus developed and validated to support this conceptual model (Stockdale & Brockett, 2011).

Deci and Ryan (2000) contend that self-determination theory may provide great insight into determining self-directed learning. Self-determination theory supports the presence of intrinsic and extrinsic motivation within individuals, and Deci and Ryan (2000) believe that self-direction in learning is best supported when the learning is freely chosen. Additionally, it has been established that students learn and more fully understand new information when their motivation for learning is intrinsic rather than extrinsic (Vanteenkiste, Simons, Lens, Sheldon, & Deci, 2004). Academic motivation is a psychological concept in education that relates to curiosity, persistence, learning, and performance (Vallerand, Pelletier, & Blais, 1992). Intrinsic motivation is the drive to pursue an activity for the pleasure or satisfaction derived from the activity itself. Extrinsic motivation, on the other hand, involves pursuing an activity out of a sense of obligation or as a means to an end (Fairchild, Horst, Finney, & Barron, 2005).

Undergraduate educational programs allow students accepted into accredited programs in athletic training or nursing to be eligible to sit for certification/licensure exams at the end of their academic programs and, upon passing the exam, enter the workforce as certified athletic trainers (AT) or nurses (RN). These professions have maintained an entry point for their professions at the undergraduate level while other similar professions such as physical therapy, occupation therapy, and physician assisting have moved to a graduate degree as a requirement for entry into the field. Educators within accredited athletic training programs (ATP) and bachelor of science in nursing (BSN) programs are left with the unique challenge of working with younger

students who are trying to balance the demands of undergraduate general education with the imposing demands of professional education and integrated clinical education. To meet those demands, there has been a shift in healthcare education to strategies focused upon developing learning skills and approaches that promote deep levels of understanding and professional attitudes within students. However, there is a shortage of literature that examines the change in the learner profile of these students specific to the development of self-directed learning readiness or self-determination (Healey, 2008; Linares, 1999; Shokar, 2002; Fisher, King, & Tague, 2001).

Self-Directed Learning Readiness

The term “self-directed learning readiness” (SDLR) originated in Guglielmino’s (1978) research to develop the Self-Directed Learning Readiness Scale (SDLRS), the instrument that has been used most widely in medical and educational research to measure SDLR (Linares, 1999; Shokar et al., 2002). Lunyk-Child et al. (2001) examined some of the perceptions related to self-directed learning in nursing faculty and students. They identified that some barriers to implementation of self-directed learning strategies included student confusion, frustration and dissatisfaction. The authors also cited that if self-directed learning (SDL) were to be implemented in nursing curricula, it would be important to provide the necessary faculty development. Moving forward, a review of SDL in nursing education (O’Shea, 2003) found SDL to have many benefits to nursing students including deeper learning, increased preceptor scores and increased motivation for learning. However, this review also highlighted that acquiring SDL skills in nursing students seemed to be dependent upon student preference, readiness for SDL, and the comfort level of the nurse educators implementing the concept. More recently, Daniels (2011) employed a pre-test/post-test design to examine the impact on SDLRS scores of including a SDL module that explained the purpose and process of SDL in the experimental group. The experimental group had a significant increase in their SDLRS scores as compared to the control group that did not receive the module as a part of the course. This study highlights the importance of being explicit with the goals and processes that might lead to increased SDL. It is interesting that Daniels (2011) also found in the qualitative portion of the study that nursing students reported having no formal information about the purpose or process of SDL and faculty admitted they were unsure of the methods to facilitate SDL.

Prior to 2011, there is very little mention of SDL in the athletic training education literature. Hughes and Berry (2011) speak to the definition of SDL as set forth by Knowles and present a “model” to promote SDL in athletic training education. They emphasize increased use of on-line database searches to emphasize evidence-based practice, allowing for some student choice in presentation formats within the curricula, and including things like an electronic discussion thread to discuss patient problems. In addition, these authors specify that the current “millennial” athletic training students must be exposed to adult education theories within their education in order to become life-long learners and cite self-directed learning as one of the primary andragogical teaching methods in which to facilitate this concept.

Much work has been done to examine the socio-demographic and psychological variables that may be associated with self-directed learning readiness. Previous studies have found an increase in SDLR scores for individuals that hold a college degree when compared to individuals without a college education (Oliveira, Silva, Guglielmino, & Guglielmino, 2009). In addition, the majority of the research studies support an increase in self-directed learning readiness with increasing age (Oliveira & Simoes, 2006). These factors would support the idea of increasing SDLR scores as students progressed through their undergraduate curriculum and increased in chronological age.

Although much has been espoused regarding the desirability of SDL in undergraduate nursing and athletic training students, there seems to be a lack of evidence regarding the presence of SDL or the development of SDL within these undergraduate health professions students.

Academic Motivation

Academic motivation is a learning variable that has been investigated as a construct relating to academic success and an aptitude for life-long learning (Vallerand, Pelletier, & Blais, 1992). In a study that examined motivation and its relationship to learning with medical students, the AMS was administered to four consecutive classes of medical students. The medical students with a stronger intrinsic motivation for learning scored significantly higher during their clerkship assessment than did students with more extrinsic motivation (Sobral, 2004). Additionally, in a study investigating the various reasons allied health students believe they are attending college, Ballman and Mueller (2008) administered the AMS to 222 upperclassmen and graduate students. The most frequent motivational styles in these allied health students were extrinsic in nature. In order to represent the AMS scores as a mark on a continuum anchored by intrinsic motivation and extrinsic motivation, some researchers report the results as a single motivation index called the Self-Determination Index (SDI) (Deci & Ryan, 2002, p .47). The range of scores on the SDI is from -18 to +18 with a mean score of 10 (Hegarty, 2010). The higher a participant scores, the more intrinsically motivated that individual is purported to be. A more recent study conducted with graduate education and business students reported results on the AMS using the Self-Determination Index and found the mean SDI score of these graduate students to be 7.30 (Hegarty, 2010).

As part of the self-study and program evaluation required by accrediting bodies, professional preparation programs in athletic training and nursing should assess whether they are adequately preparing students with regard to self-directed learning readiness (SDLR) and self-determination at different points within the professional curriculum. This study was designed to examine the self-directed learning readiness and self-determination of AT and BSN students longitudinally throughout their undergraduate education.

Purpose

The purpose of this longitudinal, descriptive study was to determine if the learning profile of undergraduate athletic training and nursing undergraduate students

related to self-directed learning and academic motivation changed across their respective curricula. The operational definition of the learning profile for this study included subject scores on the Personal Responsibility for Self-Direction in Learning Scale (PRO-SDLS) and subject scores on the Academic Motivation Scale (AMS). Self-directed learning can be influenced by characteristics of the learner and by elements of the learning environment. This study sought to determine the sensitivity of the PRO-SDLS and the AMS for assessing a change in the learning profile within this undergraduate population. Although the study was longitudinal in nature, no attempt was made to evaluate elements of the curriculum or instruction that may have influenced a change in self-directed learning or academic motivation.

Methods

Subjects

In order to be included in this longitudinal study, students had to be classified as accepted students within the Bachelor of Science in Nursing (BSN) or the Athletic Training Education Program (ATEP) at a small, private Midwestern University in the Fall of 2010. This study was approved by the University's Institutional Review Board and all subjects signed an informed consent document to participate in the study.

Instruments

Personal Responsibility Orientation to Self-Direction in Learning Scale (PRO-SDLS). The PRO-SDLS is a 25-item self-report instrument that uses a 5 point Likert scale scoring for each item. The PRO-SDLS has established reliability of .95 (Stockdale & Brockett, 2011). The maximum score for the PRO-SDLS is 113. The average score for undergraduate and graduate students completing the PRO-SDLS questionnaire is 80.05 and the standard deviation is 12.47. The PRO-SDLS provides two subscale scores based upon Brockett and Hiemstra's (1991) model of self-direction in learning. The Teaching-Learning Transaction (TLT) is a measure of the factors associated with the teaching-learning experience (Stockdale & Brockett, 2011). It is acknowledged that a teacher often facilitates the learning process for students, but self-directed learning requires that the student has a willingness to take control over their learning and it is this willingness that ultimately determines a student's potential for self-direction (Brockett & Hiemstra, 1991, p. 26). The second subscale is termed the Learner Characteristic (LC) (Stockdale & Brockett, 2011). This subscale represents the "individual's preference for assuming responsibility for learning" (Brockett & Hiemstra, 1991, p. 24). Stockdale & Brockett (2011) established congruent validity for the PRO-SDLS by assessing the relationship of the PRO-SDLS to the more established Self-Directed Learning Readiness Scale (SDLRS) (Guglielmino, 1978). In addition, Stockdale and Brockett (2011) found the PRO-SDLS to be an improved measure over the SDLRS for prediction of GPA in their population of 196 undergraduate and graduate students.

Academic Motivation Scale (AMS). Vallerand et al. developed the Academic Motivation Scale (AMS) in 1989 to establish whether individuals are driven by

intrinsic or extrinsic motivation in their academic pursuits (1992). The AMS was developed using the constructs surrounding the self-determination theory established by Deci and Ryan (2002). The AMS is composed of 28 items assessed on a 7-point scale. Validation studies of the AMS provide support for the distinction between the broader concepts of intrinsic and extrinsic motivation (Cokley, 2000; Vallerand et al., 1992). Reporting the results of the AMS as the Self-Determination Index (SDI) offers the advantage of “a significant reduction of variables needed to represent the different types of motivation at a given level” (Deci & Ryan, 2002, p. 47).

Procedure

Students who signed the informed consent document and agreed to participate in the study were given an assessment packet during their first, second, and third years of matriculation within each accredited program of study. The assessment packet contained a copy of the PRO-SDLS and AMS which required approximately 20 minutes to complete. Each testing session was administered by the primary researcher.

Data Analysis

Data analysis was performed using the Statistical Package for the Social Sciences 17.0 (SPSS 17.0). Due to the small sample size in the athletic training group ($n = 9$) and the disparity in size to the nursing group ($n = 41$), only descriptive statistics were used for data analysis.

Results

Fifty subjects, 41 nursing and 9 athletic training students, had complete data sets of PRO-SDLS and AMS data within their first, second, and third year of the respective programs. Of the 41 nursing students, 7 were male and 34 were female. In the athletic training group, there were 5 male subjects and 4 female subjects.

Descriptive statistics for the mean scores of the PRO-SDLRS by profession are provided in Table 1. Nursing students experienced a decline in their PRO-SDLS scores from year 1-2 of the program; and, although they increased their scores from year 2-3, they never returned to initial levels of self-direction. Athletic training students experienced a steady increase in PRO-SDLS scores each year of the program.

Table 1. *Descriptive Statistics for the PRO-SDLS at each year of the professional curriculum for BSN and AT Students*

Group	n	PRO-SDLS1	PRO-SDLS2	PRO-SDLS3
BSN	41	95.24 + 10.14	91.37 + 8.93	94.49 + 9.20
AT	9	87.22 + 7.66	89.67 + 12.51	94.11 + 9.28

The PRO-SDLS was also scored to determine subscale scores for each subject with regard to the “Teaching-Learning Transaction (TLT)” (Results in Table 2) and “Learner Characteristics (LC)” (Table 3).

Table 2. *Descriptive Statistics for the TLT Subscale Scores at Each Year of the Professional Curriculum for BSN and AT Students*

Group	n	TLT1	TLT2	TLT3
BSN	41	43.10 + 5.06	41.80 + 4.65	43.56 + 5.18
ATEP	9	39.33 + 4.66	40.89 + 6.41	42.33 + 5.15

A steady increase was observed for the TLT subscale by the athletic training students each successive year, while a drop in TLT subscale scores was noted for the nursing students between years 1 and 2 of study. The nursing students also experienced a drop in the Learner Characteristics subscale score and did not recover to initial values by the end of the program, while the athletic training students saw an increase in the LC subscale scores for each year in the curriculum (Table 3).

Table 3. *Descriptive Statistics for the LC Subscale Scores at Each Year of the Professional Curriculum for BSN and AT Students*

Group	n	LC1	LC2	LC3
BSN	41	52.15 + 5.84	49.56 + 5.40	51.00 + 4.92
ATEP	9	47.89 + 4.73	48.78 + 6.99	51.56 + 5.22

Descriptive statistics for the mean scores of the self-determination index (SDI) by profession are provided in Table 4. Very little change was observed in this variable for nursing or athletic training students across the years of the curriculum.

Table 4. *Descriptive Statistics for the Academic Motivation Scale (reported as the Self-Determination Index) at Each Year of the Professional Curriculum for BSN and AT Students*

Group	n	SDI1	SDI2	SDI3
BSN	41	12.32 + 2.32	12.79 + 3.26	12.62 + 2.21
ATEP	9	12.61 + 1.69	12.82 + 1.30	12.98 + 2.41

Discussion

This study examined development of self-directed learning and self-determination for nursing and athletic training students enrolled in undergraduate, accredited professional preparation programs. Although the athletic training sample was small, the steady increases seen for the PRO-SDLS (total score and subscale scores) seem to indicate an increase in learner self-direction within that group across their curriculum. At the time of this study, the University had just completed a semester conversion process that came into effect the fall in which the first data points were obtained. It is interesting to note that the athletic training curriculum emphasized several changes in the curriculum during the semester conversion that were intended to improve student-centered learning. In particular, more self-selected case studies were used throughout the curriculum to reinforce clinical decision-making. Additionally, many instructors in the program began to implement team-based learning within the classroom. Team-based learning is an instructional strategy that uses group activities to improve the quality of student learning by helping students learn how to apply concepts (Michaelson, Knight, & Fink, 2004, vii).

The drop in PRO-SDLS scores (total and subscale scores) for the nursing students is consistent with previous literature that cites a “sophomore slump” for content-heavy curricula such as medicine (Premkumar, K. et al, 2013). The changes in the SDI scores for all subjects were very small; thus, in this study, it did not appear that the Academic Motivation Index was sensitive to change within this population.

Both nursing and athletic training programs use a competitive selection process to admit students into their programs after students complete their freshman or directed observation year. It is important in programs that use a selective admission process to determine measures that best represent success in the program and eventual success on the certification exams. Grade point average (GPA) has often been found to be an excellent predictor of pass rates on the certification exams both in athletic training and nursing (Alexander & Brophy, 1997; Beeson & Kissling, 2001; Harrelson, Gallaspy, Knight, & Leaver-Dunn, 1997). Stockdale and Brockett (2011) found the PRO-SDLS to be an accurate predictor of undergraduate GPA and hypothesize that the PRO-SDLS is ultimately useful in identifying student initiative, which often leads to GPA success. Higher Self-Directed Learning Readiness Scale (Guglielmino, 1978) scores have also been positively associated with persistence to graduation with a bachelor’s degree when compared to those who dropped while in pursuit of that degree (Long & Smith, 1996).

This study is unique in that although the nursing literature has started to examine the development of their students beyond typical academic predictors such as GPA and pass rates on licensure exams, learning profile descriptions are largely absent in the athletic training education literature. Since the sample was quite small, the results cannot be generalized, but the score increase on the PRO-SDLS in this study suggests a possible influence of time for improvement seen in the athletic training students. Although it is impossible to conclude from this study that those improvements were related to participation in the athletic training curriculum,

examination of the curriculum for aspects that are supportive of the development of SDL would be useful.

Limitations of this study, in addition to sample size, are that the study was largely observational in nature and did not examine the impact of any specific intervention or instructional strategy on the subjects' self-direction or self-determination. Future research should examine the impact of specific andragogical or curricular change upon the learner profile of these students. Additionally, future studies could attempt to correlate PRO-SDLS or SDI scores to GPA, board examinations scores, or clinical evaluation scores. Qualitative interviews with the students might provide additional insight into the processes that supported or detracted from their feelings of self-direction.

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